PATENT SPECIFICATION

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(21) Application No. 8964/73 (22) Filed 23 Feb. 1973
(31) Convention Application No. 2 215 628 (32) Filed 30 March 1972 in
(33) Germany (DT)
(44) Complete Specification published 29 Oct. 1975
(51) INT. CL.² G06K 15/00
(52) Index at acceptance
B6A 42A 42D
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(19)

(54) LAMINAR MEMBERS WITH INTERNAL SECURITY THREADS

(71) We, INTERNATIONAL BUSINESS MACHINES CORPORATION, a Corporation organized and existing under the laws of the State of New York in the United States of America, of Armonk, New York 10504, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to laminar members, for example, banknotes, credit cards and certificates, with internal security threads.

Banknotes with metallic safety thread are well known. The function of the safety thread is to permit the spotting of counterfiet notes, and to complicate the forging of banknotes.

German Offenlegungsschrift 2,107,113 suggests a method of detecting banknote counterfeits. In that specification, a paper for making banknotes is described having a security structure which can be detected electrically, magnetically or photo-

According to one aspect of the invention, we provide a laminar member having a legible number thereon to distinguish it from other members of identical appearance and having an internal security thread which is coded to represent said number in accordance with a predetermined code.

According to another aspect of the invention, we provide a method of manufacturing a plurality of individually identifiable, similar laminar members having an internal security thread including printing a different number on each member and coding the security thread in each member to represent the number printed on that member in accordance with a single predetermined code.

The metal security thread may be a metal thread containing punched codings Equally possible are codings of such a nature that the punched holes are, for instance, filled with magnetisable material, or not filled according to the coding, and that the remaining part of the security thread consists of non-magnetisable material.

The codings in the security thread are in a predetermined correlation to the bank-

PATENTS ACT 1949

SPECIFICATION NO 1411477

The following amendments were allowed under Section 29 on 6 December 1976

Page 1, line 51, page 4, line 15 *after* coded *insert* by means of apertures therein

Page 1, line 59, page 4, line 50 *after* member *insert* by means of apertures therein

Page 4 *delete* lines 19, 20 and 21

Page 4 lines 22 and 32 *delete* claim 3 *insert* claim 1 or 2

Page 4, line 25 *delete* claim 4 *insert* claim 3

Page 4 *delete* lines 29, 30 and 31

Page 4, line 54 *delete* claim 11 *insert* claim 9

Page 4 *for* Claims 4, 5, 7, 8, 9, 10, 11 and 12 *read* 3, 4, 5, 6, 7, 8, 9 and 10

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0.1 mm approximately. By selecting the dimensions in such a manner 50 punches can easily be provided in standard banknotes, said punched holes corresponding to a binary information of 2^{50} possibilities, which for the anticipated fields of application will be fully sufficient in most cases.

The coding can be registered on a central storage medium. This allows a full coverage of the existing stock of banknotes or securities. The coding advantageously contains information on reading and controlling at the beginning and the end of the thread, information giving the type of the paper, the currency, the denomination and for the current numbers for each type of denomination with control bits. According to the kind of use intended it is, of course, equally possibe to divide the coded information in a different manner.

When the coded banknote or security is issued it can be machine-read and written off an associated central or non-central storage, and then it is taken back again each individual note is read by machine and written into the associated central or non-central storage. Thus, it is possible to achieve a complete or almost complete survey of the banknotes or securities in circulation.

How the invention can be carried into effect will now be particularly described.

As a security measure banknotes normally are made of paper in which a plain metal security thread is inserted. The invention is embodied in such banknotes by punch coding the security thread. The coding utilises say 50 punch positions spaced about 1mm apart, the holes having a diameter in the range of 0.05 to 0.1mm. Such holes are formed by means of a cumputer-controlled laser drill.

Coding is effected centrally for each currency territory; for instance by the German Bundesbank in Germany and it is recorded when the banknote is made.

The above-mentioned 50 punches of a coding correspond to 50 information bits and can therefore hold 2^{50} binary data i.e. approximately 10^{15} decimal data.

The correlation of the code in the metal security thread and the number printed onto the banknote can be effected centrally in each currency territory e.g. by the German Bundesbank in the Federal Republic of Germany by a computer installed there. For each banknote this computer would generate a corresponding banknote number and banknote code and directly or indirectly control the banknote printer and the banknote coding unit. This corresponding number and code is at the same time stored centrally in a data store.

After all banknotes in circulation have been coded or replaced by coded banknotes the computer of the Bundesbank would know which banknotes are in circulation, what denomination they have and which number.

The coding of the punched holes in the metal security thread can be, for instance, of the following structure: punched holes 1 and 2, i.e. bits 1 and 2 represent the first part of the read-control information at the beginning of the security thread. The information bits i.e. punched holes 3-9, represent for instance, the kind of currency used i.e. whether German marks, US dollars, French francs, or pounds sterling are involved. Information bits 10-13, i.e. the corresponding punched holes 10-13, indicate the kind of denomination for the banknote. This feature serves for distinguishing between the banknotes equally DM 5, DM 10, DM 20, DM 50, DM 100, DM 500, DM 1.000. The following information bits i.e. punched holes 14-48, serve for coding a current number for each kind of denomination with the associated control bits. The two last punched holes 49 and 50 represent the second part of the read-control information at the end of the metal security thread.

The entire flow of banknotes of a currency territory can be controlled in that the codings of the banknotes are read upon all processes of handing the banknotes in or out i.e. when they are given either to the customer or back to the bank. For that purpose, reading devices can be employed either reading individual banknotes or reading stacks of banknotes one after the other.

If the Bundesbank, or quite generally the central bank of a currency territory issues banknotes to the district banks or other institutes these banknotes are read by the federal bank reading device and the coding is written off the central federal bank storage. On the other hand, the receiving banks and similar institutes read the incoming banknotes and add them to their non-central storages.

In the individual banks and their counters, as well as generally in all institutes having an important banknote turnover, bank note reading devices are used which are of such a design that they are able to read the banknotes upon their being handed in to the bank, and of storing them in the associated storage i.e. to book them upon receipt and of writing them off upon the handing-over of banknotes to customers. This permits a continuous control of bank notes received and paid out. Another advantage is that each individual financial institute can execute an uncomplicated balancing of the stock of banknotes paid and received. This can be done hourly, daily, or weekly or at any other

suitable interval.

When reading-in the banknotes to be received, and when booking the corresponding code numbers on the non-central storage medium of each individual bank branch office or other institute, or upon the reading-in of the banknotes which are received from the central bank, these code numbers can be compared with a list of so-called black code numbers. These black code numbers are all those code numbers which have been declared illegal and which have been communicated for instance by the German Bundesbank, to all non-central storages via data tele-processing. These black code numbers can be both counterfeit numbers and numbers of banknotes captured by a bank hold-up, a robbery or in an act of blackmail. The special stock of code numbers containing the black code numbers in the individual non-central storage media can be updated by the Bundesbank, in the so-called on-line or also in the off-line operation, daily, weekly or in any other suitable interval.

The applicability of this banknote security system will now be considered in connection with an example of armed robbery. The banknotes which are still at the bank after a hold-up are read via the banknote reading device and written off the former non-central storage. It can thus be ascertained exactly, and for instance printed by a connected printer, which of the banknotes and with which number, denomination and of which currency have been stolen in the hold hold-up. This permits the supply of exact information on the sum, the denomination, the currency and the individual number of the banknotes. These code numbers of the stolen banknotes are communicated by data tele-processing to the central computer of the Bundesbank and from there supplied as so-called black code numbers to all non-central storages via tele-processing. Thus, each bank, branch office of a bank, or other institute are very quickly informed on the latest list of black code numbers.

In the case of blackmail, the demanded banknotes are read by a banknote reading device, transmitted, after an intermediate storing process on the non-central storage, to the Bundesbank computer and communicated from that computer as so-called black code numbers to all non-central storages via data tele-processing. Here, too, immediate complete information is thus available. Ascertaining the identity of the robbers and/or blackmailers can be achieved in such a manner that when receiving a banknote at the bank and comparing its number with the stored black code numbrs it is immediately recognized as belonging to the black number list and the respective banknote and its number is communicated centrally via data tele-processing to the Bundesbank computer. This information can then be passed on to interested authorities, for instance the Federal Bureau of Criminal Investigation.

Upon the blackflow of unlawfully obtained banknotes the black code numbers can be further treated as such until the secured loot has been read in via a banknote reader and returned to its legal owner. The fact that the stolen or blackmailed banknotes have been returned to their legal owner is transmitted, together with the corresponding code numbers, to the central Bundesbank computer via data tele-processing. There, the former black code numbers can be declared, again via data tele-processing, to be regular code numbers. Accordingly, these black code numbers are deleted on the non-central storage media. Subsequently, these numbers are registered for the legal owner as his own code numbers.

Analogously to the detection of stolen or blackmailed money, counterfeit money can be detected. If it is known that counterfeit money with a particular set of numbers has been brought into circulation these numbers, too, can be noted as such by the central Bundesbank computer, as specified above and stored in the corresponding storage section of the non-central storages. Another kind of counterfeit detection consists in that the coding numbers stored in the non-central storage media are communicated, in predetermined intervals, to the central Bundesbank computer via data tele-processing or a similar means of information. The Bundesbank computer then compares the read-in coding numbers of the communicated and circulating banknotes with the list of banknotes centrally stored by said computer. If this comparison shows that the banknote stored in the Bundesbank computer is not on that list, or is listed twice, that banknote must be a fake. This fact is noticed centrally by the Bundesbank computer and passed on to the interested authorities. Any information on the number of the banknote, its place of receipt and similar interesting data are then, for instance, passed on the Federal Bureau of Criminal Investigation.

By means of this system of coding it can be advantageously determined how many banknotes, and in which denomination and per time unit are handled in an institute connected to the system; all banknote numbers can be permanently stored; banknotes can be selectively detected whose numbers are discretionary and can therefore be prescribed. This permits total safeguarding of the entire banknote circulation against hold-ups, robbery and

blackmail and in view of the fact that all circulating banknote numbers are known to the system 100% counterfeit which is unrecognizable as such even to experts can be detected too.

The security system for banknotes described above can be applied in a similar manner to securities, certificates, credit cards and similar items.

WHAT WE CLAIM IS:—

1. A laminar member having a legible number thereon to distinguish it from other members of identical appearance and having an internal security thread which is coded to represent said number in accordance with a predetermined code.

2. A member as claimed in claim 1, in which the security thread is of metal.

3. A member as claimed in claim 1 or claim 2, in which the security thread is coded by means of apertures therein.

4. A member as claimed in claim 3, in which the apertures were formed by a laser beam.

5. A member as claimed in claim 4, in which the apertures are 1 mm apart and have a diameter in the range of 0.05 to 0.1 mm.

6. A member as claimed in claim 1 or claim 2, in which the security thread is coded magnetically.

7. A member as claimed in claim 3, in which the security thread is of non-magnetic material and the apertures in it are filled with a magnetic material.

8. A member as claimed in any preceding claim, which is a banknote, the security thread being further coded to represent the denomination of the banknote.

9. A member as claimed in any preceding claim, which is a credit card.

10. A member as claimed in any preceding claim, in which the security thread is further coded to control the operation of code reading means.

11. A method of manufacturing a plurality of individually identifiable, similar laminar members having an internal security thread, including printing a different number on each member and coding the security thread in each member to represent the number printed on that member in accordance with a single predetermined code.

12. A method as claimed in claim 11, substantially as hereinbefore particularly described.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1975.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.